

Southwest Fisheries Science Center
National Marine Fisheries Service
National Oceanic and Atmospheric Administration
La Jolla, California

SECTION 515 PRE-DISSEMINATION REVIEW & DOCUMENTATION FORM
(5/2003)

AUTHOR/RESPONSIBLE OFFICE:

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TITLE/DESCRIPTION: Pathfinder Version 5.0 Global Area Coverage (GAC) Sea Surface Temperature (SST) Data

PRESENTATION/RELEASE DATE: January 1985 - ongoing

MEDIUM: Internet

PRE-DISSEMINATION REVIEW:

Name and Title of Reviewing Official: Dr. Franklin Schwing, Division Director
(Must be at least one level above person generating the information product)

Pursuant to Section 515 of Public Law 106-554 (the Data Quality Act), this product has undergone a pre-dissemination review.


Signature

2/15/06
Date

SECTION 515 INFORMATION QUALITY DOCUMENTATION

I. Utility of Information Product

Explain how the information product meets the standards for utility:

A. Is the information helpful, beneficial or serviceable to the intended user?

The satellite-derived products generated by the NOAA Coastwatch, West Coast Regional Node (WCRN), offer useful information to data customers in easily accessible formats. The products are utilized by a wide range of users, including members of the scientific community, managers, fishing men and women, educators, and the interested public.

The Pathfinder Version 5.0 Sea Surface Temperature (SST) data set is a reprocessing of global SST data from NOAA's Advanced Very High Resolution Radiometer (AVHRR) aboard NOAA's Polar Operational Environmental Satellites (POES). The University of Miami's Rosenstiel School of Marine and Atmospheric Science (RSMAS) and NOAA's National Oceanographic Data Center (NODC) developed the reprocessing effort. This reprocessing task provides a long-term continuous data series for use in climate research as well as other applications requiring the highest quality of data. While this data is not a near-real time product, it is updated as frequently as resources and quality control imperatives allow.

This data has been used in scientific research (e.g., the Tagging of Pacific Pelagics (TOPP) project) as well as operational applications of the Southwest Fisheries Science Center which model the dynamics of Cetacean Habitat. Pathfinder data is assimilated into both projects once it becomes available, replacing the near real-time data used in the more immediate timeframe. This effort provides the project with more reliable and accurate SST data over the AVHRR Global Area Coverage SST for use in the analysis of the tracks of tagged animals.

B. Is the data or information product an improvement over previously available information? Is it more current or detailed? Is it more useful or accessible to the public? Has it been improved based on comments from or interactions with customers?

Pathfinder SST data is made available on the SWFSC-Environmental Research Division's website, OceanWatch Live Access Server (<http://las.pfeg.noaa.gov/oceanwatch.html>), as well as the NOAA CoastWatch WCRN's website (<http://coastwatch.pfeg.noaa.gov/coastwatch/CWBrowser.jsp>), and can be accessed using any computer with internet access and the appropriate browser. The product is also distributed via OpenDAP/DODS.

All venues for accessing CoastWatch data and images include information required to contact CoastWatch personnel. Improvements are continuously being implemented based on feedback from customers, with a focus on usability and accessibility.

In particular, the Pathfinder project provides reprocessed SST which is more accurate and includes more valid SST pixels than the near real-time Global Area Coverage (GAC) SST product on which it is based. The Pathfinder SST algorithm is a slightly modified version of the non-linear SST algorithm used to calculate near real-time AVHRR SST, accompanied by highly superior tests for cloud contamination. Details on algorithm improvements from the GAC SST products and the Pathfinder SST data are presented below in Section III. Improvements have also been made from previous versions of Pathfinder SST data sets. The Pathfinder version 5.0 data offers SST at a global resolution of 4km, the highest resolution available globally. Previous resolution for Pathfinder data was 9km. Other key improvements include ice mask identification, and an improved land mask. (See NODC's 4km Pathfinder Version 5.0 User's Guide at <http://www.nodc.noaa.gov/sog/pathfinder4km/userguide.html>).

C. What media are used in the dissemination of the information? Printed publications? CD-ROM? Internet?

Is the product made available in a standard data format?

Does it use consistent attribute naming and unit conventions to ensure that the information is accessible to a broad range of users with a variety of operating systems and data needs?

This is an internet product, distributed via simple browser, Live Access Server, and OpenDAP/DODS.

The product is available in formats commonly used by imaging programs (e.g., HDF, netCDF files), GIS programs (ASCII grid), spreadsheet programs (CSV and other simple ASCII files), and technical computing programs (MATLAB binary files).

All attributes are named in a manner consistent with NASA/NOAA guidelines. All units follow System Internationale (SI) and United Nations Educational, Scientific and Cultural Organization (UNESCO) guidelines. At the discretion of the user, data may also be displayed and downloaded in units of measurement traditionally used by mariners and marine scientists.

II. Integrity of Information Product

Explain (Circle) how the information product meets the standards for integrity:

A. All electronic information disseminated by NOAA adheres to the standards set out in Appendix III, _ Security of Automated Information Resources, _ OMB Circular A-130; the Computer Security Act; and the Government Information Security Reform Act.

B. If information is confidential, it is safeguarded pursuant to the Privacy Act and Titles 13, 15, and 22 of the U.S. Code (confidentiality of census, business and financial information).

C. Other/Discussion (e.g., Confidentiality of Statistics of the Magnuson-Stevens Fishery Conservation and Management Act; NOAA Administrative Order 216-100 - Protection of Confidential Fisheries Statistics; 50 CFR 229.11, Confidentiality of information collected under the Marine Mammal Protection Act.)

III. Objectivity of Information Product

(1) Indicate which of the following categories of information products apply for this product:

Original Data

• **Synthesized Products**

Interpreted Products

Hydrometeorological, Hazardous Chemical Spill, and Space Weather Warnings,
Forecasts, and Advisories
Experimental Products
Natural Resource Plans
Corporate and General Information

**(2) Describe how this information product meets the applicable objectivity standards.
(See the DQA Documentation and Pre-Dissemination Review Guidelines for assistance and
attach the appropriate completed documentation to this form.)**

B. Synthesized Products

The objectivity of synthesized products is achieved by using data of known quality, applying sound analytical techniques, and reviewing the products or processes used to create them before dissemination. For synthesized products, please document the following:

Data and information sources are identified or made available upon request.

All data sources are identified and linked from the CoastWatch WCRN website.

The Pathfinder SST data source is identified as NOAA's National Oceanographic Data Center (NODC) and the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences (RSMAS). Information on NODC's Pathfinder Project can be found at (<http://www.nodc.noaa.gov/sog/pathfinder4km/>). Information on the RSMAS Pathfinder effort can be found at (<http://www.rsmas.miami.edu/groups/rsl/pathfinder/>).

Further information on NOAA's POES satellites can be found at (<http://www.oso.noaa.gov/poes/index.htm>).

NOAA uses data of known quality or from sources acceptable to the relevant scientific and technical communities in order to ensure that synthesized products are valid, credible and useful.

The source data are derived by methods common to the relevant scientific and technical communities. Data gathered by the AVHRR instrument on NOAA's POES satellites is sub-sampled and stored aboard the satellite. This data is later downloaded to receiving stations. The AVHRR instrument is capable of measuring SST at a maximum resolution of 1.1 km. Because global area coverage (GAC) data is sub-sampled, resolution is reduced from 1.1km to 4km for the GAC and Pathfinder products.

The calculation of surface temperatures from the AVHRR spectral channels is based on the non-linear sea surface temperature algorithm (NLSST). (Walton *et al.*, 1998). Changes in this algorithm, outlined in Kilpatrick *et al.*, 2001, have been made to increase the accuracy of the Pathfinder data over the near real-time GAC SST. Different atmospheric corrections are used for two classes of atmospheric conditions, dry and moist, compared with a single atmospheric correction used in the GAC SST. Continuous

algorithm validation is accomplished by the monthly calculation of new algorithm coefficients based on a matchup database of in situ SST measurements. Satellite and in situ observations are valid for matchup purposes if they occur within 30 minutes and 0.1 degree of latitude and longitude of each other. In situ observations are supplied by moored and drifting buoys operated by a number of oceanographic and meteorological agencies. This matchup database is made available for independent algorithm development and validation. The Pathfinder data set uses a conservative cloudmask to eliminate contaminated SST values. (*Kilpatrick et al., 2001.*)

Synthesized products are created using methods that are either published in standard methods manuals, documented in accessible formats by the dissemination office, or generally accepted by the relevant scientific and technical communities.

The methods employed in the mapping and composite image generation are consistent with techniques in the published literature. Data from ascending and descending passes are acquired from NODC, along with the appropriate data quality control files. Composite images of the ascending and descending passes are generated using only the highest quality data (flag value = 7). These are mapped to 8-day and monthly duration geographic grids (0.05 degrees longitude by 0.05 degrees latitude) using a simple arithmetic mean, following the recommendations of the International Ocean-Color Coordinating Group (*Antoine et al., 2004*) and using methods described by *Smith and Wessel, 1990*. Graphical end products are generated using the Generic Mapping Tools software (*Wessel and Smith, 1998*). Digital data are also made available via Live Access Server and OpenDAP/DODS.

NOAA includes the methods by which synthesized products are created when they are disseminated or makes them available upon request.

A basic description of all methods is included in the accompanying FGDC -compliant metadata files. Metadata satisfying CF, COARDS, THREDDS ACDD, and CoastWatch-HDF specifications is also available. More detailed descriptions of these methods are available on-line, with links originating at the WCRN web page. A complete description of the methods, including the program code used to generate the end products from the data supplied by NESDIS, is available upon request.

NOAA reviews synthesized products or the procedures used to create them (e.g. statistical procedures, models, or other analysis tools) to ensure their validity.

SST validation is an integral part of the Pathfinder processing effort. NODC runs tests to ensure file integrity during processing. Investigations and tests on the accuracy and validity of the SST data are also conducted. The monthly calculation of algorithm coefficients helps to ensure product accuracy. Studies investigating the accuracy of Pathfinder data also contribute to their validity.

References:

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